

**Marked-up version of prior pending claims with all changes shown follows:**

1. [Amended] An ultrasonic motor comprising:

[in which radial vibrations of] a disc of electro-active material (7,11) for producing radial vibrations [are converted via];  
at least one flexensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the [or each] diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the [said] diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

elastic fins (5,5a,5b) each having a fin tip which contacts the friction interface such that, the fin tip has an instantaneous rotation about a rotation point not in line with the fin tip contact point in the direction of rotation, thus causing a horizontal friction reaction which drives the rotor (4,4a,4b,14) on an expansive stroke of the amplifier (6a,6b,13), yet allows the fin to relax on a downstroke and the fin tip to slide on the friction interface.

2. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the disc of electro-active material (7,11) is a piezoelectric material[, with] having an electrode of a conductive material deposited on each circular face of the disc.

3. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the disc of electro-active material (7,11) is an electrostrictive material[, with] having an electrode of a conductive material deposited on each circular face of the disc.

4. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the disc of electro-active material (7,11) is a magnetostrictive material excited by an oscillating magnetic field.

5. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the disc of electro-active material (7,11) is of a multi-layer construction having [with] at least one [or more layers] layer of electro-active material interleaved with layers of conductive electrode material.

6. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the [or each flexextensional displacement amplifier] diaphragm (6a,6b,13) is bonded to the surface of the electro-active disc (7,11) with an epoxy or a metal loaded epoxy.

7. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the [or each flexextensional displacement amplifier] diaphragm (6a,6b,13) is bonded to the surface of the electro-active disc (7,11) with an anaerobic adhesive or modified anaerobic adhesive.

8. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the [or each flexextensional displacement amplifier] diaphragm (6a,6b,13) is soldered or diffusion bonded to the surface of the electro-active disc (7,11).

9. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein a respective diaphragm (6a,6b) is attached to each side of the disc (7) and a single rotor (4) positioned

opposite one of the respective diaphragms (6b) turns about an axle(1) which is attached to the other respective diaphragm (6a).

10. [Amended] An ultrasonic motor [as claimed in claim 1] comprising:  
a disc of electro-active material (7,11) for producing radial vibrations;  
at least one flexextensional displacement amplifier diaphragm (6a,6b,13) for converting the  
radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the  
disc (7,11), the diaphragm mounted on the disk;  
a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being  
converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);  
wherein a respective diaphragm (6a,6b) is attached to each side of the disc (7) and a respective rotor (4a,4b) is arranged opposite each diaphragm (6a,6b) of which one rotor (4b) is attached to an axle and the other rotor (4a) can slide axially along the axle.

11. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein an axle (1) is attached to the [electro-active material] disc (7,11) and one or more rotors (4a,4b,13) turn about said axle (1) on bearings (10,17).

12. [Amended] An ultrasonic motor [as claimed in claim 1] comprising:  
a disc of electro-active material (7,11) for producing radial vibrations;  
at least one flexextensional displacement amplifier diaphragm (6a,6b,13) for converting the  
radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the  
disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein one or more rotors (4a,4b,14) are held in contact with the [displacement amplifier diaphragms' (6a,6b,13)] oscillating surfaces of the diaphragm by [utilising] magnetic attraction[, when this magnetic attraction is] brought about by the rotors (4a,4b,14) having a remnant magnetic polarization [polarisation] and the diaphragms (6a,6b,13) being made of ferromagnetic materials, such as the metals Iron, Nickel or Cobalt or their alloys.

13. [Amended] An ultrasonic motor [as claimed in claim 1] comprising:

a disc of electro-active material (7,11) for producing radial vibrations;

at least one flextensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein one or more rotors (4a,4b,14) are held in contact with the [displacement amplifier diaphragms' (6a,6b,13)] oscillating surfaces of the diaphragm by [utilising] magnetic attraction[, when this magnetic attraction is] brought about by the diaphragms (6a,6b,13), having a remnant magnetic polarization [polarisation] and the rotors (4a,4b,14) being made of ferromagnetic materials, such as the metals Iron, Nickel, or Cobalt or their alloys.

14. [Amended] An ultrasonic motor [as claimed in claim 1] comprising:

a disc of electro-active material (7,11) for producing radial vibrations;

at least one flextensional displacement amplifier diaphragm (6a,6b,13) for converting the radial vibrations into vibrations of the diaphragm (6a,6b,13) perpendicular to the plane of the disc (7,11), the diaphragm mounted on the disk;

a rotor (4,4a,4b,14) coupled to the diaphragm, the diaphragm vibrations then being converted into rotary motion via frictional contact at a diaphragm/rotor interface (6b/4,11/14);

wherein one or more rotors (4a,4b,14) are held in contact with the [displacement amplifier diaphragms' (6a,6b,13)] oscillating surfaces of the diaphragm by [utilising] magnetic attraction[, when this magnetic attraction is] brought about by an electromagnet winding.

15. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein one or more rotors (4a,4b,14) are held in contact with the diaphragms (6a,6b,13) by one or more springs.

16. [Amended] An ultrasonic motor as [claimed] recited in 1 wherein the displacement amplifier [(6a,6b,13)] diaphragm (6a,6b,13) and [electro-active] the disc (7,11) assembly rotates [is the rotating component and] about the rotor (4a,4b,14) [is the stationary component].

17. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the displacement amplifier diaphragm (6a,6b,13) and [electro-active] the disc (7,11) assembly is [the] stationary [component and the rotor (4a,4b,14) is the rotating component].

18. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein a layer or structure of an elastic material is attached to at least one of the [surface] surfaces of the rotor/diaphragm interface (5,5a,5b).

19. [Cancelled]

20. [Amended] An ultrasonic motor as [claimed] recited in claim [19] 1 wherein the elastic fins (5,5a,5b) make [a] contact at an oblique angle to the surface of the friction interface between the rotating component and the diaphragm (6a,6b,13) of the stationary component.

21. [Amended] An ultrasonic motor as [claimed] recited in claim [19] 1 wherein the elastic fins (5,5a,5b), which make contact with the friction interface, have one or more curved sections in their length.

22. [Amended] An ultrasonic motor as [claimed] recited in claim [19] 1 wherein the elastic fins (5,5a,5b), which make contact with the friction interface, have at least two straight sections that are joined in at an angle.

23. [Amended] An ultrasonic motor as [claimed] recited in claim 1 wherein the [or each flexextensional amplifier] diaphragm (6a,6b,13) is dish-shaped having [with] an upset central region.

24. [Amended] An ultrasonic motor as [claimed] recited in claim 23 wherein the central region is spaced from the plane of the disc.

25. [Amended] An ultrasonic motor as [claimed] recited in claim 23 wherein the central region (13a) is contained within the plane of the disc.

REMARKS

Claims 1-25 are pending.

Claims 1-25 are rejected.

Claim 19 is cancelled without prejudice.

Claims 1-18 & 20-25 are amended.

Claims 26-29 are added.

**I. Allowable subject matter**

The Applicant thanks the Examiner for indicating that claims 10, 12-14 and 19-22 would be allowed if rewritten to overcome the rejections under 35 U.S.C. 112, second paragraph and to include all of the limitations of the base claim and any intervening claims. The Applicant has incorporated the limitation of claim 19 into base claim 1. Additionally, the Applicant has incorporated base claim 1 into allowable claims 10, 12, 13 and 14.

**II. Rejection under 35 U.S.C. 112, second paragraph**

The Examiner has rejected claims 1-25 under 35 U.S.C. 112, second paragraph, as being indefinite and vague. The Applicant has amended claims 1-18 and 20-25 in view of the Examiner's comments to overcome this rejection. Withdrawal of the rejection under 35 U.S.C. 112, second paragraph is respectfully requested.

**III. Rejection under 35 USC § 102(b)**

It is the Examiner's opinion that claims 1-3, 5, 9, 11, 17 and 23-28 are anticipated by Uchino. Applicant traverses this rejection, however, in the interest of prosecution efficiency, the Applicant has amended independent claim 1 to include the limitations of allowable claim 19.

Applicant respectfully requests withdrawal of the rejection as the grounds for the rejection are now moot.

**IV. Rejection under 35 USC § 103(a)**

It is the Examiner's opinion that claims 4, 6-8, 15, 16 and 18 are unpatentable over Uchino. Applicant traverses this rejection, however, in the interest of prosecution efficiency, the Applicant has amended independent claim 1 to include the limitations of allowable claim 19.

Applicant respectfully requests withdrawal of the rejection as the grounds for the rejection are now moot.

**V. Summary**

By this amendment, applicant has amended the claims to more clearly state the present invention. Applicant believes that claims 1-18 & 20-29 are in condition for allowance. Should there remain any questions or other matters whose resolution may be advanced by a telephone call, the Examiner is cordially invited to contact the applicant's undersigned attorney at his number below.

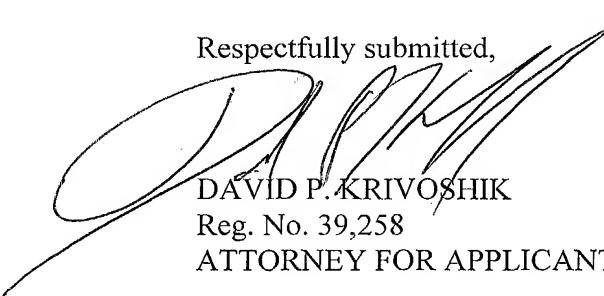
**VI. Correspondence**

Please address all correspondence to David P. Krivoshik, Esq., Mathews, Collins, Shepherd and McKay, PA, 100 Thanet Circle Suite 306, Princeton, New Jersey 08540-3674. All telephone calls should be made directly to me at 609-924-8555, fax communications should be sent directly to me at 609-924-3036 and e-mail should be made directly to me at [dkrivoshik@mathewslaw.com](mailto:dkrivoshik@mathewslaw.com).

**VII. Fees**

If there are any fees due in respect to this amendment, please charge them to Deposit Account No. 13-2165. Authority is hereby given to charge any such deficiency, or credit any overpayment to Deposit Account No. 13-2165 Mathews, Collins, Shepherd & McKay. The Examiner is invited to contact the undersigned if further information is required.

Respectfully submitted,

  
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